DOCUMENT RESUME

ED 317 671 CE 054 087

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TITLE	Empirical Evidence on Private Training. Background Paper No. 7a.
SPONS AGENCY	Department of Labor, Washington, DC. Commission on Workforce Quality and Labor Market Efficiency.
PUB DATE	Sep 89
CONTRACT	99-9-4759-75-011-04
NOTE	29p.; In "Investing in People: A Strategy to Address America's Workforce Crisis" (CE 054 080).
PUB TYPE	Information Analyses (070)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Adult Education; *Corporate Education; Costs; *Data Collection; *Educational Practices; *Employment Practices; Labor Force Development; Labor Needs; *On the Job Training; Policy Formation; *Research Problems

ABSTRACT

Recent trends indicate increased interest in the education and training of the labor force. However, information in the extent of on-the-job training (OJT) is complicated by conceptual difficulties, such as the informal nature of much OJT, lack of reliable cost data on formal training, and the fact that many studies based on stratified samples lack weighting to a total population. Varying estimates of the numbers of workers to whom training is provided arise due to different approaches to measuring the types and duration of training, with few studies tracking trends over time. Studies of differences among types of workers trained lack consensus on whether male or female, union or nonunion workers receive more OJT. Generally, white, more educated, and full-time workers are trained more. No firm relationship between training and employer size has been determined. In some studies, minimum wage laws appear to constrain training. Overall, the lack of information seriously hampers the formation of policy. If concern about employer-sponsored training is likely to continue, systematic data collection is vital. (43 references) (SK)

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7a. EMPIRICAL EVIDENCE ON PRIVATE TRAINING

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Introduction

A number of recent developments--concern about the ability of American firms to compete in international markets, the perception (as yet unreflected in official productivity figures) that we are in the midst of unusually rapid technological change, and the belief that taking advantage of technological opportunities will require a better-trained workforce--have combined to increase interest in improving the education and training of the labor force. While this interest has not yet led to either major increases in resources devoted to upgrading the workforce or a decision to welcome many highly-educated would-be entrants from abroad--indeed, perhaps <u>because</u> major changes have not yet occurred--this is a good time to take stock of what we know about the training of the U.S. labor force.

This paper focuses on training provided by private employers, with some comparisons with training received by government workers. After a discussion of the difficulties of measuring training, the paper summarizes recent evidence on the extent of training in recent data, and available evidence on trends over time. Differences in access to training among different population groups are discussed next. Finally, attention is turned to two narrower questions of more direct policy interest: training offered by different-sized employers and training in minimum-wage jobs. Implications of these findings for policy are discussed in the concluding section.

Measuring Training

Obtaining information on the extent of training of the workforce is complicated both by conceptual problems and by difficulty in actually measuring those aspects of training which seem relatively well-defined.

Much of the conceptual difficulty of measuring employer-provided training is due to the fact that an important part of such training occurs informally, on the job. While there are difficulties in measuring formal training, what we would like to measure is relatively well-defined: an individual is either in a training program or not, formal training has a identifiable start and end, and one should in principle be able to determine either how many hours the worker spent, or how many dollars the employer spent, on any particular training program.

Informal training is produced jointly with the primary output of the worker, and is therefore more elusive. Workers learn from watching other workers, may share easier ways to do the work either while working or during breaks, and are indirectly "instructed" whenever a supervisor constructively criticizes their work. Knowing whether informal training is happening in any given week may be difficult to determine; one hopes that for most workers it never ends. The dollar cost is illusive not only because the time spent by supervisors and other workers is not logged, but also because the worker's productivity is likely to be reduced while in training. Thus, it is difficult to measure informal training in hours (from the worker's side) or in dollars (from the firm's side). This poses problems for understanding what is happening to employer-provided training, overall.

In addition to conceptual problems, there are narrower problems of measurement as well. While in principle the costs of formal training programs should be known to firms, in fact reliable figures seem to be hard to come by. Moreover, surveys which are directed toward firms typically elicit little information about workers (detailed information about their education is thought too burdensome, while other characteristics such as race are thought too sensitive); questions directed to workers may lead to inaccurate data about things one might think the worker knew (the size or industry of the firm, and even the worker's own wage rate).

In addition to these conceptual and measurement problems which are reasonably well known, there is another (unanticipated) recurrent shortcoming in many of the studies discussed below: they are known to be based on stratified samples of workers or firms, yet no weighting to a population total of interest is undertaken.

Faced with these difficulties in directly sighting training, economist-hunters often look instead for its tracks: if training makes people more productive, wages of workers receiving training should rise faster than wages of those who do not. If one assumes wages rise only because of training, one can indirectly infer how much training is occurring from wage data alone (Mincer, 1962).

Unfortunately for economist-hunters, other beasts leave similarly-shaped tracks. Those of an institutional persuasion will object that wages seem to rise with seniority independent of productivity (Medoff and Abraham, 1981). Others have noted that wages rising with tenure provide incentives for workers to work hard, in order to collect the

implied bonus; Lazear and Moore (1984) claim that such incentives may be more important than rising productivity in explaining wage increases. Freeman (1979) notes that demographically-induced shifts in age-earnings profiles argue against assuming that age-earnings profiles are driven solely by individual human capital investments. Topel and Ward (1988) argue that job changing is an important source of earnings growth. While one can treat such job-changing as the result of individual investments in job-search, and hence as "human capital," it clearly is not investment in training as generally understood. Consequently, direct measurement of private training is emphasized in this paper.

All of this is an extended apology for the fact that much of what we would like to know about training is not known. Data on informal on-the-job training is sparse compared to formal training programs, and hard data on the extent or cost of training is much less common than information on participation. Thin as our knowledge base is at a point in time, it is even harder to know whether things are getting better worse. For all their shortcomings, data on educational attainment are far more extensive than comparable data on post-school training.

Extent of Training

Table 1 provides both an introduction to the major sources of information about employer-provided training and an overview of the extent of training as measured in these surveys.

All of the surveys in Table 1 which ask whether an individual has received or is receiving training are population surveys which, when weighted, should be expected to describe the U.S. labor force. The

three studies which present estimates of the proportion of those employed who received formal training from their current employer (Haber (1985), Lillard and Tan (1985), and Hollenbeck and Willke (1985)) all find that roughly 10 percent of those employed have received such training. Tierney's (1983b) estimate of 5 percent is lower because it refers to the year preceding the survey; indeed, given the difference in reference periods, it's surprising that it is as high as it is. Lillard and Tan (1985) is the only study in this group with explicit data on informal on-the-job training; they show it to be somewhat more common than formal training (15 percent of those employed having learned needed skills this way). Even allowing for the fact that this figure does not count skills learned informally on previous jobs, it is lower than one would expect if such training is the major force behind the tendency of earnings to rise with time on the job.

Duncan and Hoffman's (1978) estimate that 20 percent of those employed are currently receiving training is based on a different way of approaching the question. Rather than asking whether one had received training and if so what sort of training (as the CPS analyzed by Lillard and Tan did), the PSID sequence used by Duncan and Hoffman asks the worker how long it takes for a new worker to become fully trained and qualified, and they then count as receiving training anyone who has been on their current job for that length of time or less. That their estimate of those currently receiving training is close to Lillard and Tan's estimate of those who have received training on their job suggests to me that rather subtle semantic distinctions ("receiving training" versus "becoming fully trained and qualified") may have a rather large

impact on our estimate of the extent of training--particularly for the more elusive informal on-the-job training.

This difference in approaches to measuring training leads to even more striking differences in estimates of weeks of training for those who have received it. For those studies which are based on direct questions about formal training, the estimates for length of training range from 6 to 9 weeks. Of course, some individuals will not have completed their program, so completed training should be somewhat longer in average duration. Duncan and Hoffman's estimate of how long it takes to become fully trained and qualified runs much higher--over 1.5 years.

Also shown in the table is an estimate of how long it takes to become fully trained and qualified from Bishop and Kang's (1984) analysis of the Employment Opportunities Pilot Project (EOPP) data. While the difference between this estimate and Duncan and Hoffman's is striking, the unusual sampling frame of EOPP explains at least a significant share of the difference. EOPP over-sampled low-wage employers, and the question refers to the most recent hire, so that even within the firm, low-wage, high-turnover jobs are over-represented. Unfortunately, none of the published analyses of EOPP data appear to have re-weighted the data to be representative of jobs at all points on the wage scale. Whether one focuses on workers or new hires depends on one's question: focusing on workers is more appropriate for characterizing the stock of training in the workforce, while focusing on new hires may be more appropriate for assessing the costs to employers.[1]

Data on hours of training are sparser still. Tierney's (1983) tabulation of CPS data on formal training produces an estimate of about

120 hours. In contrast, Bishop and Kang's estimate for the EOPP population is only 11 hours. What is striking in Bishop and Kang's data is the relative importance of formal and informal training. Depending on whether or not one counts time spent watching others do the job, informal training (for those who receive it) lasts considerably longer than do formal training programs. While I strongly suspect that the disparity is enhanced by the sample being studied (one typically imagines formal training to be more concentrated on higher-wage workers), I also suspect the message that formal training is the tip of the iceberg is not completely an artifact.[2]

While one might be inclined to dismiss the EOPP data as referring to a special and unrepresentative population, it is certainly a population of considerable policy interest. It also contains one of the few estimates of the costs to firms of training workers. By combining data on time spent by new employees, their supervisors, and coworkers on training with productivity indices for newly hired and more senior workers, Bishop (1982a) estimates that training costs in the first three months amount to 30-64 percent of a more experienced worker's productivity or wage over the same three-month period. The range in the above estimate is due partly to assumptions used in combining training and productivity indices, but the largest difference is between different occupational groups, with estimates for professional, technical, and managerial workers roughly twice as high as those for service workers, with other white-collar workers and blue collar workers falling in between.

Hill (1987) collected specific estimates of components of training costs (formal training programs, informal training, wages in excess of productivity, materials, and outside training) in occupations in which employers typically prefer but do not require education beyond high school.[3] She concluded that firms spend an average of $8500 and from six months to two years to train high school graduates for these occupations. Postsecondary education reduced these costs by more than a quarter on average, but they remain substantial. Informal training costs were roughly twice those of formal training, with wages in excess of productivity the largest component of all.

Finally, information from a study by the Bureau of National Affairs's Personnel Policy Forum illustrates just how difficult it is to get reliable information on training costs from employers. Roughly half of the sample (which over-represents large firms) has a separate training budget (so, presumably the relevant fraction is considerably less than half among all firms). Only seven percent of the 140 panel firms reported (formal) training costs per employee; for these 10-11 firms (depending on year), median costs per trainee were $122-250. The study correctly flags the low response rate.

Trends Over Time

Data on trends in employer-provided training over time appear to be limited to tabulations of Current Population Survey Surveys of Adult Education in 1969, 1972, 1975, 1978, and 1981. Medoff's (1982) analysis of the first four of these surveys finds no trend in the probability of private sector workers participating in employer-provided training

programs at their place of work. He does find an increase between 1978 and 1981 in the probability of participating in any employer-sponsored programs, suggesting an increase in off-worksite but employer-sponsored training in this period.

He finds a sharp drop in hours of training programs provided by employers at the workplace between 1972 and 1978,[4] and no increase in total hours of employer-sponsored training programs (regardless of location) over the 1969-78 period. Given evidence that employers were finding it harder to recruit suitable workers over much of this period, Medoff finds the lack of evidence of increased training surprising. From a more recent perspective, where the allegedly increased interest in short-term payoffs has led to fears that training is being reduced, the participation numbers are encouraging and the hours numbers perhaps less surprising.

Tierney (1983b) presents trends in participation in employer-provided (i.e., employer-sponsored, at-the-workplace programs) between 1968 and 1981, presenting both private-sector and government-worker participation rates. He finds no trend for private workers, but an upward trend for government workers.

Differences Among Workers

Several studies have compared the training (typically, the probability of having received any) between different groups of workers. Here I summarize findings for several such comparisons.

The most surprising result is the lack of consensus on whether men or women acquire more training. Duncan and Hoffman (1978) and Haber

(1985) report, as one might expect given the literature on labor force interruptions and post-school training, that women receive less training than men. Tierney (1983b) also finds this to be the case, though the differences are small and declined significantly in recent years. Hollenbeck and Willke (1985) find that males and female household heads receive more training. Lilland and Tan (1985) report that women are more likely to have received formal training, and have the same likelihood of receiving informal OJT in their CPS data. The National Longitudinal Surveys (which followed four birth x sex cohorts starting in 1966-67), however, seems to support the traditional view--mature women receiving less training than either young men or older men--though any conclusion is complicated by lack of a direct comparison between men and women the same age. The "new NLS," which followed a cohort of males and females, age 14-21 in 1978, also finds young men are more likely to receive on-the-job training than are young women (Lynch, 1989).[5]

Whites receive more training than blacks (Lillard and Tan, 1985; Tierney, 1983b; Duncan and Hoffman, 1978; Lynch, 1989). The only surprise here is that Lillard and Tan find the difference is in access to formal programs rather than informal on-the-job training.

More educated workers get more training (Bishop, 1985; Lillard and Tan, 1985; Haber, 1985; Hollenbeck and Willke, 1983, Duncan and Hoffman, 1978).[6] The only debate here seems to be whether the relationship persists when those with a Ph.D. or professional degree are compared to those with masters degrees.

Results for differences in previous experience are somewhat richer, though not completely consistent between studies. Mincer (1988)

finds that more experienced workers are more likely to have received training, but less likely to be receiving it. Duncan and Hoffman (1978) find that both general experience and years of experience with current employer prior to current position increase the training in one's current position. Lynch finds positive effects of general experience but not years with employer. Bishop (1985) reports that greater relevant experience is associated with jobs which require more time for an untrained worker to learn, but less training investment for the typical new hire--firms place those with more relevant experience in jobs which have more to learn, but such experience helps one learn them more cheaply.

Studies of differences in training between union and non-union workers appear not to have reached a consensus. Mincer finds unionization significantly negatively related to both training required by the job and probability of being in training. Barron, Black, and Loewenstein (1989) report that union workers are less likely to receive the types of training covered by EOPP, though the differences are typically not statistically significant. Bishop (1985) finds no appreciable relationship between unionization and either weeks to become fully trained or an index of hours of training. Lynch (1989) finds union workers more likely to receive training. Unfortunately, none of these studies explains why its results differ from others.

A number of other differences have been less frequently studied. Part-time workers receive less (formal) training (Haber, 1985; Hollenbeck and Willke, 1983). Lillard and Tan (1985) find some positive relationship between the rate of technical change in an industry and the

probability of its workers receiving formal training, though evidence for this hypothesis is consistent only for those with education beyond a BA. Bishop (1982b) finds no statistically significant differences in training for workers hired under hiring subsidies (WIN for welfare recipients, or the Targeted Jobs Tax Credit for various disadvantaged groups), but significantly more training by both management and coworkers in jobs which received CETA OJT subsidies.

Training and Employer Size

There is considerable interest in the relationship between employer size and training, both because small employers are disproportionate hirers of young workers and because the role of small firms in generating new jobs has received so much attention. (In fact, existing small firms do not grow faster than large ones; small firms' role in job creation just reflects the fact that new firms create jobs and that new firms tend to be small. It would be important to distinguish between small firms and new ones, but available data do not permit this.)

Haber (1985) reports that Survey of Income and Program Participation (SIPP) respondents who worked for larger firms (at least 100 workers) were about twice as likely to participate in formal training programs. Given economies of scale in providing such training, this is the expected result. Barron, Black, and Loewenstein (1987a) report that larger establishments and firms with multiple locations are more likely to provide the types of training detailed in the EOPP data, and these differences are typically significant statistically. Bishop

(1982) finds that more training is provided by the largest and smallest firms; this u-shaped pattern persists when one controls for industry and occupation (Bishop, 1985). Consequently, there is no significant linear relationship between employer size and training in these data (Barron, Black, and Loewenstein, 1987b). Hill (1987, 1988) also reports mixed results.

Overall, the evidence suggests that larger employers provide more training, but the very smallest ones do, too. However, much of the evidence so far is based on the EOPP survey, in which low-wage, high-turnover jobs are over-represented. If training, wages, and employer size are positively related, the EOPP sampling scheme should attenuate the size-training relationship.

Minimum Wages and Training

Employers do not provide training on the job unless it is worthwhile for them to do so. Because training is costly, it is generally assumed that those receiving training earn lower wages while in training than they would if the firm were making no such costly outlays. However, for an individual whose value to employers is at or slightly above the minimum wage, "buying" training by accepting a lower wage is illegal! Consequently, it is sometimes proposed that young workers--those most in need of training--be subject to a lower minimum wage in order to not interfere with the training process.

It is tempting to dismiss this line of argument with the assertion that minimum wage jobs have so little training content that--whatever the desirability of minimum wage laws on other grounds--concern about

effects on training is misplaced. If employers' reports about training of minimum wage workers are correct, however, more training than one might have guessed is going on in minimum-wage jobs. Converse et al. (1981) report that about half of minimum wage workers are in jobs which require formal training, and that this training lasts (on average) 12 days. Moreover, it takes a new worker 4-5 weeks to reach company standards of performance. Bishop and Kang's (1984) results for EOPP workers (who are disproportionately but not exclusively low-wage) are broadly consistent with Converse et al.'s results. While these are not overwhelming levels of training, they are high enough that it is worth asking whether they are changed by the minimum wage.

Evidence on this question is quite mixed. Perhaps the most direct evidence on the issue comes from Bishop's (1982b, pp. 182-183) analysis of EOPP data. He finds that, after controlling for wage rates generally, those who receive the minimum wage receive less training, both by management and peers. In fact, however, his dummy variables for minimum wage workers include both those paid the legally required minimum and those whose jobs are not subject to the FLSA (some of which pay less than the minimum).

Leighton and Mincer (1981) find that earnings growth and participation in training programs is lower in states where the impact of the minimum wage (measured by the ratio of the minimum wage to average wage adjusted for differences in coverage across industries) is higher. However, it is not clear whether this means that there is more training and wage growth in high-wage states generally, or whether the minimum wage is directly implicated by the evidence.[7]

Lazear and Miller (1981) compared earnings growth in industries newly covered by the 1967 amendments to the Fair Labor Standards Act, to see whether the payoff to work experience was lower there than in uncovered industries (which should not reduce their training in response to the minimum wage). They find no evidence for this hypothesis, though they emphasize the weakness of the data rather than claiming the training hypothesis has been disproved.

Hashimoto (1982) asked whether each period of work experience does less to increase earnings for those workers most likely (by virtue of low wages or employment in covered industries) to be constrained by the minimum wage. He obtains sensible results for young white males, but not for young black males. Once again, it is not clear whether this is evidence that low-wage workers profit less from experience or whether the minimum wage is an important constraint on their training.

My reading is that the evidence is inconclusive, and that trying to measure the effects of minimum wage laws on training by observing their effects on earnings growth is unlikely to succeed. Consider this back-of-envelope calculation. Suppose that investments in training earn a return on costs of 10 percent per year. If the production foregone in formal training equals the wage while time in informal training costs half of the wage (as would be true if productivity rose linearly from zero to the wage during the period of training), the typical individual in Corcoran et al.'s sample of minimum wage jobs would invest about 15 days' earnings in his/her training, or about $500 for a full-time worker. A 10 percent return on that investment would be $50 per year, or about 2.5 cents per hour for a full-time worker. So if this level of

investment were precluded altogether by the minimum wage, its tracks in wage-gain equations would be awfully hard to detect. Obviously, this calculation is only a crude guesstimate, but I think it is dramatic enough that refinements are unlikely to alter the basic conclusion.

It is possible, however, that using the level of training from a period of relatively high minimum wage laws seriously distorts the calculation. One might argue that the Corcoran et al. data just show how much the minimum wage had, by then, reduced training. The current environment provides a chance to test this view, if a data-collection effort could be mounted before the rumored increase in the minimum wage occurs. Retabulating the Bishop and Converse et al. data in a way which highlighted coverage status would also be helpful.

Policy Implications

Often, learning that what we know about a particular policy is less than we had hoped "merely" undercuts the rationale for a policy we think is needed. In the case of training, the lack of information signals a serious limitation in what a direct policy attack might hope to achieve. The limited data available suggests that informal on the job training is at least as important as--and probably considerably more important than--formal training. But the major reason our knowledge about OJT is limited is that it is so difficult to measure with any precision. Researchers face some unique problems trying to measure training--neither firms nor workers have much incentive to respond thoughtfully to the questions we ask--but at least those answering our questions have no obvious incentive to mislead us. If one were to try

to subsidize informal training, on the other hand, the incentives to exaggerate are obvious. Consequently, attempts to use subsidies have either focused on formal training or provided hiring subsidies which are not directly linked to any training commitment. The elusiveness of informal training makes it more difficult to subsidize than to measure.[8]

The current method of collecting information about training does not give any reason to hope that we will know much more about the subject in ten years than we do today. Occasional, uncoordinated efforts have their advantages, but they leave us with very little information about representative national samples of individuals apart from counts of those participating in formal training programs. If policy makers believe that concern about employer-provided training is likely to persist, the time to start a systematic data collection program is yesterday. The current volume of concerns about training voiced by firms may even be enough to drown out complaints about the costs of complying with an employer-based survey. But whether the data should be collected from employers or workers--or from a matched sample of workers and employers--depends on what it is about training that we most want to know.[9]

Because most of the training data summarized in this paper has asked about training on current job, and the sample is restricted to the civilian labor force, little has been said about training provided by the military. According to Hollenbeck and Willke (1985), about 2 percent of the labor force participated in armed forces training, which provided skills or training for their present (civilian) job. While this training may not loom large in the overall total of job-related

training, the fact that the Armed Forces provides training to thousands of individuals each year, that it has a serious interest of its own in evaluating the performance of those it trains, and that most of its trainees pursue civilian careers after completing their military service means that there is probably a great deal about training in civilian occupations to be learned from the military.[10] Much of the training provided by the Armed Forces is for blue collar and service specialties, and is directed toward the middle rather than the top of the ability distribution. And, unlike many of the projects one might design, the major barriers to a serious study of military training and civilian labor markets are organizational (inter-agency cooperation) rather than conceptual.

Table 1: Summary of Extent of Employer-Provided Training

Type of Measure	Study	Data Set	Time Interval	Specific Measure	Proportion or Average Value
Received training	Haber (1985)	1984 SIPP	Time with current employer	Employer-provided training program	8%
	Lillard & Tan (1985)	1983 CPS	Time with current employer	Company [formal] training program	12%
				Informal OJT	15%
				Other training	5%
	Hollenbeck & Willke (1985)	1983 CPS	Time with current employer	Company [formal] training program	11%
				Informal OJT	14%
	Tierney (1983b)	1981 CPS	Last year	Employer-provided training programs	5%
	Duncan & Hoffman (1978)	1975 PSID	Currently receiving	Formal training or OJT	20%
Weeks of Training	Haber (1985)	1984 SIPP	Time since 1980 with current employer	Weeks employer-paid training at work	6 weeks
	Tierney (1983a)	1978 CPS	Last year	Weeks of employer-provided training	9 weeks
	Bishop & Kang (1984)	1982 EOPP	NA	Weeks to become fully trained	7 weeks
	Duncan and Hoffman (1978)	1975 PSID	NA	Weeks to become fully trained	86 weeks
Hours of training	Tierney (1983a)	1978 CPS	NA	Hours of employer-provided training	120 hours
	Bishop & Kang (1984)	1982 EOPP	First three months on job	Hours formal training	11 hours
				Hours informal training by supervisors	51 hours
				Hours informal training by coworkers	24 hours

NOTES

[1]If one worker quits, and is replaced and trained by the employer, one might argue the stock of relevant training was unchanged (depending on what the first workers's new job involves). But it is clear from the employer's viewpoint that the cost of training has increased.

[2]The EOPP numbers are no doubt biased downward by limiting the question to the first three months on the job. However, since the mean estimate of time to become fully qualified is roughly half of three months (7 weeks), I would not want to put too much stress on this quirk of the data. Converse et al. report considerably more formal training (an average, for those receiving formal training, of 52 hours or 12 days) among minimum wage workers, but that on average it takes about twice that long for workers to "reach company standards"--a lower level of performance, one would suspect, than "fully trained and qualified."

[3]Specifically, the occupations were computer programmer, EDP equipment operator, electric/electronic engineering technician, mechanical engineering technician, drafters, surveying technicians, and secretaries.

[4]Medoff offsets the potential distortion caused by a change in the maximum number of weeks of training allowed by Census coding procedures, by recoding all years data with the tighter top-coding convention.

[5] Lynch notes that the NLS training measure may miss informal on-the-job training.

[6]Lynch's (1989) education effects are positive but not statistically significant.

[7]Moreover, their results on earnings growth do not test directly whether the effect of experience on earnings growth is reduced by the minimum wage; yet this is the real question. Minimum wage laws could reduce earnings by reducing the probability of getting any experience, even if they don't change the training content of a given amount of experience.

[8]It is possible to tie a hiring subsidy to indicators of subsequent performance which one believes are related to training--e.g., wage growth or employment stability. Apart from the obvious incentive this creates for employers to shun those without a stable record of past employment, it is also unsuited to markets where promotions come from changes in employer rather than progress through an internal labor market. It is often alleged (though I am skeptical) that small employers provide entry level training only to find their workers "kidnapped" by larger firms.

[9]For example, data on costs must come from employers. Surveying employers is not without disadvantages; e.g., sampling designs which adequately represent small, new firms are difficult, whereas worker surveys contact the employees of such firms automatically.

[10]An anonymous reviewer suggested an in-process review of the Army apprenticeship program could usefully be studied from this perspective.

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